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ABSTRACT

Tumultuous changes in the world's economic and social orders and technological advances are transforming the world from an industrial society to a knowledge society. The globalization of markets and rise of high-performance companies are altering the workplace dramatically and changing the roles and responsibilities of vocational-technical institutions and educators as they prepare the work force of the 21st century. Historically, emphasis has been directed toward identifying very small units of work (duties/tasks) and then equipping workers with the essential hand skills to perform those duties/tasks repetitively. In the future, however, work will be organized into larger units of production, and workers will be expected to assume greater decision-making responsibilities in planning and performing the work to be done. Skills standards will become increasingly important as a tool for improving work force education. Ohio's vocational education community illustrates the increased emphasis on standards, quality, and lifelong learning necessary to prepare and sustain the work force of the 21st century. Among the essential characteristics of 21st century vocational-technical education and training are the following: career clusters accommodating a wider range of occupations; clearly articulated performance standards that are set by business, industry, and organized labor; varied, embedded, and authentic assessment strategies; problem-centered curriculum; and a worksite learning component. (Contains 11 references.) (MN)

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ED 398 409

TECHNICAL EDUCATION & TRAINING IN THE 21ST CENTURY

Public Lecture By

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Consultant on Workforce Education
Centre for Occupational Research and Development
Texas, USA

19 April 1996

U.S. DEPARTMENT OF EDUCATION
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A Public Lecture delivered under the Tay Eng Soon Scholarship Fund

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TAY ENG SOON SCHOLARSHIP FUND

The Tay Eng Soon Scholarship Fund was established in November 1993 by the Institute of Technical Education (ITE) and the 4 Polytechnics, with support from many employers, friends and members of the public, in honour of the late Dr Tay Eng Soon. The late Dr Tay was formerly the Chairman of ITE and Minister-in-charge of technical and polytechnic education between 1981 and 1993.

The $1m fund was set up to promote technical and polytechnic education through:

- the provision of scholarship awards for outstanding ITE graduates to pursue a polytechnic education;
- the provision of medals and prizes to ITE and polytechnic graduates for outstanding performance in their course of study;
- sponsoring lectures/seminars relevant to technical and polytechnic education; and
- carrying out any other activities consistent with the promotion of technical and polytechnic education.

FOREWORD

The ITE and Polytechnics play an increasingly important role in Singapore's manpower development. As educational institutions, organisations and professionals, we need to keep in touch with the changes and developments in the industrialised countries. We must tap into the strengths and learn from the experiences of other training systems if we are to stay relevant to the needs of a global economy and Singapore's society.

In this connection, the Tay Eng Soon Public Lecture aims to bring to Singapore, distinguished speakers from around the world to share their ideas and experiences with our Singapore audience. It will provide a forum for stimulating our own thinking in manpower development and generating greater public awareness and interest in education and training.

Our distinguished speaker for this inaugural lecture is Dr Darrell L Parks, currently a consultant on Workforce Education, Centre for Occupational Research and Development, Texas, USA. The full text of the public lecture is published as an ITE paper in view of its interests to others in technical education and training.

DR LAW SONG SENG
Director & Chief Executive Officer
Institute of Technical Education

THE SPEAKER

Dr Darrell L Parks has a most distinguished career in technical and vocational education since 1959, when he graduated from the Ohio State University (OSU) with a Bachelor of Science Degree.

He began his career as a teacher at the local schools in Ohio. In 1965, he obtained a Master of Science Degree from OSU, followed by a Doctor of Philosophy (PhD) in 1968. Dr parks also completed a Post-Doctoral study programme in Educational Administration in Miami University, Ohio, in 1975.

Between 1970 and 1982, Dr Parks held several senior management posts at the Ohio Department of Education. In 1982, he was promoted to be the Director of Vocational and Adult Education at the Ohio Department of Education, a post which he held until 1995. Since 1995, he has been a consultant on Workforce Education at the Centre for Occupational Research and Development, Waco, Texas.

Dr Parks also assumed several positions of professional standing. He was President of the National Association of State Directors of Vocational Technical Education Consortium and Consultant to the former National Centre for Research in Vocational Education at the Ohio State University. He was also appointed to the National Advisory Panel for the National Assessment of Vocational Education by the U.S. Department of Education (1991-94); National Task Force on Work-Based Learning (1993-95); and Technical Resource Committee formed by the U.S. Department of Education for a Study of Accountability Systems Established by States to Monitor and Evaluate Vocational Education Programmes (1993-95).

In the international arena, Dr Parks acted as a consultant in an international conference on the evolvement of a Russian/American secondary vocational school, in the former USSR, in 1990. His vast expertise and experience in the field of vocational education

was also tapped by the German authorities when he was invited to do an in-depth study of the German Apprenticeship System in 1993.

Dr Parks' professional standing in vocational and technical education was also evident through his many publications between 1984 to 1991, which included titles such as *Keeping Vocational Education at Work and Strengthening the Academic Foundations of Vocational Education.*

For his distinguished performance and invaluable contributions to the field of vocational and technical education in Ohio State, Dr Parks was presented the Distinguished Service Award, Distinguished Alumni Award and the Centennial Award of the Academic Faculty of Vocational Technical Education from OSU.

Married with four children, Dr Parks does nature study and woodworking in his pastime.

LECTURE SYNOPSIS

The presentation traces the phases of transformation a society experiences-from being agrarian to industrialised, the rise and fall of the industrial society and the emergence of a new phenomenon-*the knowledge society*- and its impact on the national and world economies.

It will also focus on the re-definition of work; the dramatic transformation of the workplace brought about by tumultuous changes in the world's economic and social orders; and its implications on the workforce.

Issues pertaining to the needs of an educated workforce as a result of the evolution of new work settings and how such needs could be met will be addressed in this lecture.

The presentation will conclude with highlights on the new roles of technical and educational institutions in relation to the emergence of the knowledge society.

Technical Education & Training in the 21st Century

INTRODUCTION

I bring you warm greetings from the United States of America and express my appreciation to you for having been invited to participate in the 1996 inaugural Tay Eng Soon Public Lecture. Indeed, it is a privilege to have been extended such an honor and I trust that what I have to share with you will be both informative and helpful as you prepare to move into a new century of workforce preparation. I extend my gratitude and respect to Dr. Law and the Organising Committee, and to Mrs. Tay, the widow of the late Dr. Tay Eng Soon, whose vision and commitment to technical education made this event possible.

Permit me to share just a brief personal background of experiences and education, not for the purpose of impressing you with my credentials, but to familiarize you with my biases and to establish a context for what I might share with you today.

I am a farm boy by birthright, having grown up on a general livestock and crop farm in western Ohio. I am extremely grateful for having been raised in an agricultural environment because I attribute that experience to the development of a strong work ethic and an adherence to high standards.

Upon graduating from high school I went to college and received a baccalaureate degree in agriculture from The Ohio State University, with a certificate to teach vocational agriculture at the secondary and postsecondary public education levels. After six years of teaching secondary and adult students, interrupted briefly by employment in the private sector, I went back to graduate school at Ohio State and completed requirements for both the masters and Ph.D. degrees in vocational/technical education. Since the completion of those degree requirements, I have been a vocational school administrator, directed the National Academy for Vocational Education that was based at The Ohio

State University and worked at the Ohio Department of Education for twenty-five years. The last twelve years of my tenure with the state education agency was spent serving as State Director of Vocational and Adult Education before I retired on January 1, 1995. Within that 12 year time span, I served as president of the National Association of State Directors of Vocational/ Technical Education and studied vocational education in Russia, Denmark, and Germany on two separate occasions.

Since my retirement from the State Department, I am serving as a workforce education consultant to the Center for Occupational Research and Development in Waco, Texas, and the National Automotive Technicians Education Foundation in Washington, DC.

Now, with that out of the way, let me proceed with the assignment for the day.

PURPOSE OF LECTURE

Today's assignment is a daunting one because technical education is rapidly becoming a multi-disciplinary enterprise, devoted to real problems in a complex policy context where technology, the ever-changing needs of business and industry, and the diversity and interests of learners bring together a variety of challenges, opportunities and shared responsibilities.

From the beginning of civilization until circa 1890, an agrarian life style prevailed throughout the world. But with the turn of the 20th Century came the beginning of the industrial revolution, accelerated by two world wars and a growing capitalistic economy.

Europe and parts of North America were caught up in an economic and cultural transformation that would literally change the world. Workers were exploited, enduring poor working conditions, long hours without benefits or overtime pay, low wages in general, and little job security.

In the 1930's labor unions began to emerge and by the mid-1950s, 35 percent of the working class in Europe and the United States of America were members of an organized labor movement that united the voices of individual workers into forces that improved working conditions, raised wages, and enhanced job security which, in turn, elevated the working class into middle income, mainstream status. Life was good!

But by 1990 only 16 percent of the workforce belonged to a labor union. Things were changing. While the agrarian life style had lasted 5,000 years, the industrial revolution was being phased out in less than a century.

Peter Drucker, a world renowned author on the topic of corporate management, recently observed that no century in recorded history has experienced so many social transformations and such radical ones as the twentieth century.

If Drucker is correct in his assessment (and I believe that he probably is), it would appear that the changes facing us with the advent of the 21st Century will be even more dramatic than what we have experienced during the present century. We are truly in uncharted waters, exploring frontiers that heretofore have not been penetrated, and facing some enormous challenges and significant opportunities, particularly as related to the whole area of work and how one prepares for a lifetime of productivity.

My intent today is to review some of the changes that are taking place in the workplace and explore how they will play upon the business that you and I are in, workforce preparation. I want to specifically focus upon the characteristics of the workplace that are going to be prevalent in the coming century and briefly discuss what I think these characteristics mean in terms of curriculum design and delivery. In the process I will touch upon such topics as the globalization of the market place, high-performance companies and the emerging phenomenon of the knowledge worker, and skill standards.

THE WORKPLACE IN TRANSFORMATION

Globalization of Markets - Major advances in transportation and communications have led to the globalization of world markets and the recognition of the economic interdependency of nations and global regions. The dependency and the free flow of information and technology across national boundaries have led to the lowering of tariffs and the formation of free-trade zones such as the European Economic Community and the North American Free Trade Agreement. This trend continues to accelerate, as does the relocation of production. Since high production equipment and technology can easily move across national boundaries, many companies have moved their production facilities to third-world nations with labor forces qualified to operate production equipment at less than the going wage.

As international competition has increased, customers have begun to expect - and get - products and services of higher quality, in greater variety, more conveniently, and in a more timely manner than in the past. These, and price, have become the new measures of competitiveness.

Companies successful in international competition have become sensitive to the needs and desires of their customers, have modified their production processes through total quality management approaches, and have set new requirements for front-line workers. These companies are being referred to as "high performance" companies.

High Performance Companies and the Knowledge Society - High-performance companies have discovered that the old, hierarchical organization responds too slowly to the rapid changes required to remain competitive. As a result, they have largely done away with mid-management personnel and have transferred their tasks and responsibilities to front-line workers. More traditional ways of doing business have given way to a new order; a movement that is being referred to as the knowledge society.

What is the knowledge society? And how does one get ready to participate in it? These are perhaps the two most fundamental and critical questions facing the world today because of their profound economic and social implications for both the free-market countries and outside the developed world.

The knowledge society requires a knowledge worker who differs from the industrial worker in several aspects. First, there is the requirement for significantly more formal education and the ability to acquire and apply theoretical and analytical knowledge under varying circumstances. No longer does work revolve around mass production, and routinized and repetitive tasks. Rather, work and the knowledge worker is reflective and creative, and work is customized to the needs and wants of the customer.

Second, knowledge workers are committed to continuous learning throughout their working lives. Unlimited access to information and the perpetual evolution of technology require constant up-dating on the latest in technological innovation and its application. Tomorrow's knowledge workers will need to acquire additional knowledge and information rapidly in order to move from one job to another in their specialty areas.

And third, knowledge workers, while being highly specialized, will not function as individual work units as was the case with the industrialized worker, but they will function as members of highly specialized teams which in itself requires a basic change in attitudes, values and beliefs on the part of knowledge workers and their employers.

Caution should be exercised, however, to assume that knowledge workers have no manual skills. Indeed, much of the knowledge work of the future will demand substantial manipulative dexterity, thus emphasizing the blending of head and hand skills. For example, the automotive technician or the precision machinist will not be effective in their respective vocations with the possession of just theoretical knowledge. Their very performance and productivity will be dependent upon their ability 'to do' as well

as 'to know'. Conversely, they will be just as ill-equipped to function effectively if all they possess are the manipulative skills without the latest in essential related knowledge and its application.

Knowledge work varies dependent upon the kind and amount of knowledge one needs. Some knowledge workers require relatively high levels of knowledge due to the sophisticated nature of their work compared to others who need less knowledge in relation to their work demands and expectations.

The point is, knowledge will be the cornerstone of all value-added work of the future and it is key to sustaining a nation's competitive posture in the global marketplace. Knowledge, not labor or raw material or capital is the key resource. It is already impacting upon the perception of work, the culture of the work environment, and the preparation and qualifications of the workforce.

The transition to a knowledge society is precipitating changes in the world's industrial sector. Old barriers are being broken down as national boundaries give way to globalization; ethnic and cultural obstacles are being overcome through diversity in the work place; businesses that use to be competitors are converging for the common good; and knowledge is increasingly a universally accessible resource. (If it is known, it is somewhere on the internet!)

What used to be subdivided is now integrated. Assembly line tasks and self-sufficient specialties have been displaced through integration, with specialists working in cross functional teams. Standardization is out and customization is in. And the notions of 'bigger is better' and 'put more energy into it' are being pushed aside in favor of 'make it smaller/quicker' and 'put more information into it.'

All of these changes in work and the work place have tremendous implications for preparing knowledge workers. Historically workers have been prepared along the line of the Tayloristic model of assembly line production, with major emphasis directed toward

identifying very small units of work commonly referred to as duties and tasks, and then equipping workers with the essential hand skills to perform such duties and tasks in repetitive fashion on the factory floor. This type of training was especially prevalent during the times of major crisis (enhancing national war production capacities) and, in the short term, it proved to be very efficient and effective.

But the Taylor model is not appropriate for preparing the knowledge workers of the future. Knowledge workers will experience a work environment that is dramatically different from the norm of the twentieth century. Work will be organized into larger units of production and workers will be expected to be more attuned to the customer, assume greater decision-making responsibilities in planning and performing the work to be done, participate as a member of a team, and be exposed to greater business risks and less job security.

Skill Standards - The creation of industry skill standards and credentialing systems are becoming more prevalent in the workplace, both on a national and an international basis and, in discussing workplace transformation, the impact of skill standards cannot be overlooked.

It is argued by skill standards proponents that standards provide the opportunity for education and the private sector to join forces to pursue several common interests. These include:

- communicating the requirements of the modern workplace;
- promoting high-performance workplace practices to improve the quality of goods and services;
- facilitating lifelong learning to raise workforce skills, which will increase worker security and mobility within the labor market; and
- improving the quality and accountability of education and training programs to better prepare people for work.

Examples of skill standards initiatives in the United States include the banking industry which is developing a curriculum that focuses

on the skills needed in that workplace. Meanwhile, health care providers are exploring the possibility of developing national standards in their field and the automotive service industry has already released the science, mathematics, and language arts skills needed by potential automotive technicians. This list of skills calls for familiarity with nearly 100 science concepts, ranging from electricity to magnetism to heat transfer, and it includes nearly 50 math skills as well. The organization used 60 certified automotive technicians to identify the skills needed to be successful in that job area.

From a personal perspective, I believe that although the skills standards movement may still be in its infancy, it is perhaps the most effective tool available for improving workforce education, and the movement will accelerate and expand across many industries and around the globe.

My belief regarding the significance of the skills standards movement is based, in part, upon personal experience in Ohio. In 1989-90 the state vocational education community worked closely with 43 different occupational groups, represented by over 700 employers, management personnel, incumbent workers and organized labor representatives, to develop competencies (or skill standards) required of entry level employees in their respective fields. In instances where official industry standards were already available (i.e., the automotive service industry), those standards were adopted in lieu of duplicating what industry had already sanctioned.

Once the competencies were developed, they became the basis for establishing learner performance criteria, designing a learner (worker) credential, and evaluating and modifying curriculum related to the various occupational fields.

Over the past seven years this industry/education alliance in Ohio has been enthusiastically received by both the business and educational communities, and it has precipitated significant and ongoing program revision and improvement throughout the state. The effort has, in fact, done exactly what the skills proponents

suggest; it has improved communications; it has improved the quality of goods and services; it has promoted lifelong learning; and it has enhanced the quality and accountability of education and training programs.

The workplace truly is in transformation! From market globalization to high performance companies and the advent of the knowledge worker to the impact of skills standards, the work environment and the work culture will be a different place than we have ever experienced. And this transformation has profound implications regarding how we prepare and sustain the workforce in the 21st Century. It will require a new curriculum and changes in how teaching and learning occurs.

THE NEW CURRICULUM

Essential characteristics of the 21st Century education and training curriculum will include:

- career clusters that accommodate a wider range of occupations;
- clearly articulated performance standards with the standards being set by business, industry and organized labor;
- assessment strategies that are varied, embedded, authentic, a natural part of the learning process; and that culminate in an industry recognized learner (worker) credential that is based upon the appropriate business/industry standards;
- problem centered curricula that are standards driven and reflect real world scenarios and circumstances; and
- a work site learning component.

Briefly, permit me to discuss each one of these characteristics.

Career Clusters - As previously noted, during the industrialization era, mass production was the way of life. Highly complex machines produced long runs of standardized products and front-line workers performed repetitive tasks day after day, year after year, throughout their entire working lives. They weren't expected to think, but

they were expected to leave their minds and their lunch boxes in their lockers and do as they were told.

Today's workers are engaged in a much more diversified and sophisticated work environment, where the watchwords are flexibility, adaptability, and dependability, and where the products or services being produced are defined by the customer. Such a work environment requires a different kind of worker; one who can think critically and is empowered to act in response to constantly shifting needs and expectations.

Furthermore, workers of today and tomorrow are not likely to work at the same job, or even within the same industry, for their entire working lives. The workplace is dynamic, expanding and contracting, shifting and adjusting, and workforce participants must be prepared to accommodate such conditions. This requires the preparation of a different kind of worker than we have known in the past; a worker with a broader base of knowledge and skills, and one who can effectively use that knowledge and apply those skills in various ways.

One approach to preparing workers for the future is to prepare them more broadly, focusing upon the kind of knowledge and skills that are common across a range of jobs, or career clusters. This common base of knowledge and skills may be referred to as "core competencies".

The trick in configuring career clusters is to establish a balance between the competencies that are sufficiently common to a broad range of occupations to have general marketability, and yet specific enough to meet the immediate needs and demands of the market place. If that balance can be struck, then the learner enjoys the best of both worlds; adaptability and transportability of knowledge and skills across a wide spectrum of employment opportunities, and the possession of sufficient specialty skills to seek and obtain immediate employment. Acknowledging that the configuration of career clusters is not a pure science, the following considerations are proposed:

- In determining career clusters, the focus should be on

the actual work that people do, rather than on the industry.

- The career clusters should be based on skill profiles rather than occupations.
- The most important criterion for configuring a career cluster is the degree of transferability of knowledge and skills within that cluster.

Illustration I is an example of some career clusters. Based upon common duties and tasks, families of occupations (career majors) within the illustrated career clusters have significantly common curricular content and offer a high degree of knowledge and technical skill transferability from one occupational field to another.

Skill Standards - As mentioned elsewhere in this presentation, industry based standards are establishing their presence in the education and training community and provide a common link between the education and employment sectors.

But standards are more than a signaling device regarding employer needs and job demands. They also establish the basis for assessing what a learner knows and is able to do in relation to the intended outcome or result. Additionally, standards serve as organizing themes or connectors around which the curriculum and learning activities are built, and they provide the basis for certifying the competence level of participants in the workforce training program. Without standards being identified in the earliest stages of the development of an education and training program, the curriculum will lack focus and assessment will be without a frame of reference. In short, it could be said that skill standards

- contextualize knowledge
- enhance the efficiency and effectiveness of the teaching/learning process
- facilitate communications among faculty, and
- provide a basis for authentic assessment.

Skill standards must include both the scale against which performance or knowledge can be assessed, and the level of achievement (benchmark) expected. Standards apply at various levels in the instructional process including **workplace basic**

standards which denote the basic literacy skills needed by all current and future workers regardless of the type or level of their vocational pursuits. **Career cluster and career major standards** relate to that grouping of occupations that require a common set of competencies or skills. And finally, **occupational standards** relate to job-specific skills that reflect unique requirements of a particular occupation or job. Important considerations that must be taken into account in the determination and use of performance or skill standards include:

- Standards at all three levels should be validated by representatives from business, industry, and organized labor.
- Standards should be the basis for creating assessment strategies and credentialing systems, and should reflect the level of skill required of competent employees in their respective occupations. If standards are set too low, incompetent people will be certified. If they are set too high, competent people may be denied access to employment.
- Recipients of certificates of achievement based on skill standards should be given preference in being hired, considered for promotion, and being offered performance incentives over those who do not possess such certificates.

One final thought regarding skill standards: they are multi-dimensional, reflecting the academic, occupational and worker behavioral requirements of the job whenever appropriate. The challenge facing technical education is how to design standards that satisfy the needs of business and industry while simultaneously addressing the expectations of the academic community. There must be a way of bringing the two camps together because neither time, nor resources, nor the movement toward contextual education with real-world relevance will permit addressing each standard independently.

Admittedly, much work needs to be done concerning how to draft such all-inclusive standards statements, but progress is being made in that regard. *Illustration II* is an example of a draft standard, drawn from existing standards resources, and built upon

the specific elements that the over-all standard should address. While the sample standard statement is quite succinct, the 'integrated curriculum standard' (ICS) description is an elaboration of the standard and really provides the substance essential to the development of appropriate learning activities and assessment strategies.

The Center for Occupational Research and Development (CORD) is currently coordinating an integrated curriculum for workforce education project that is addressing this multi-dimensional standards issue.

Assessment - Until recently, little attention had been given to the area of assessing workforce education and training other than the types of cognitive testing that are a standard part of the educational process. In this emerging era of high performance expectations, however, there has been a growing interest in a wider range of assessment strategies that measure not only what the learner knows, but also the extent to which the learner can apply that knowledge in demonstrating proficiency regarding various skills. This growing interest in performance measurement has stimulated serious dialogue about alternative assessment strategies and has provided impetus to the standards movement that is sweeping the United States.

Alternative assessment approaches must be taken into account when performance standards are being framed. As previously noted, performance standards must include both the scale against which performance or knowledge can be assessed, and the level of achievement expected. Thus, as standards are being drafted, assessment considerations must come into play to assure that learner performance can, in fact, be assessed, and denotes which assessment options would be most appropriate. Assessment strategies and techniques that do not directly relate to performance standards are of little value.

Assessment techniques must be imbedded in the curriculum and should be varied in design, ongoing, a natural part of the learning process, and provide the basis for learner credentialing. Some

Career Clustering

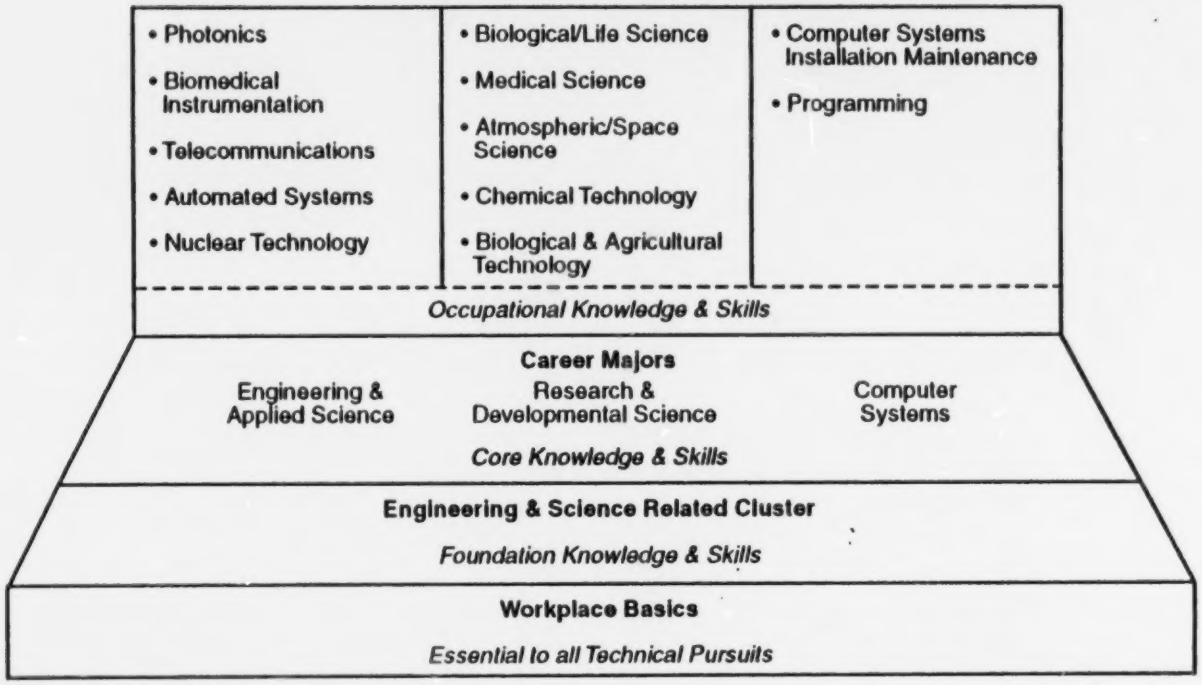

Illustration I

Integrated Curriculum Standard (ICS)

Example:
Standard -
Calibrate instrumentation used in measuring, monitoring and analysis

ICS Description -
Calibrate instrumentation used to monitor conditions and/or properties in the natural or industrial environment. Carry out and/or establish calibration procedure considering the following factors together:

1. The entity (chemical or physical property or condition) being measured;
2. The nature of the instruments used to measure and monitor the system;
3. The units of measurment used;
4. The degree of precision required and the consequences of inaccuracy; and
5. The significance of the information the instrument provides about the entire system.

Represents seven different primary sources and 62 different elements of existing academic, business/industry and employability standards

common characteristics of alternative assessment approaches include:

- asking students to perform, create, produce, or do something (i.e., work samples,on-demand demonstrations, exhibits, portfolios, journals, etc.);
- tapping higher-level thinking and problem-solving abilities through skilled questioning and/or setting up special situations for students to address;
- using tasks that represent meaningful instructional activities;
- invoking real-world applications;
- assessing performance through the use of human judgment; and
- requiring new instructional and assessment roles for teachers.

While time does not permit an extensive discussion regarding assessment, the lack of attention here should not diminish the importance of this 21st Century education and training component. Suffice it to say that there is a rapidly growing body of literature on performance assessment that offers some excellent insights on the topic.

Curriculum - Perhaps the most challenging aspect of the education and training agenda for the next century is curriculum reformation. Clearly, the way that knowledge-based content and technology are packaged will need to be dramatically changed if the educational community is serious about addressing the workforce needs of the future.

Business and industry have consistently taken education to task in recent years for not having produced a prospective employee that meets their needs. The educational community has heard this clamoring and has made numerous changes with the intent to better accommodate employer needs. Employer based advisory committees are used extensively to review education and training programs, and make suggestions for improvement. Federal evaluation initiatives have been mandated in an attempt to make state and local programs more accountable. Applied academic

courses have been developed in order to make the content more relevant to the learner and more applicable to the world of work. And in some cases, school schedules have been blocked and the school day has been lengthened to provide learners more time on task. Yet, at least in the United States, the employer satisfaction quotient remains on the low side of the scale.

Why is this the case? Is it that the wrong content is being taught? Or is it the manner in which the content is packaged and delivered. My personal opinion is that it may be the latter rather than the former.

Several observations support my opinion. First, until the advent of skill standards there had been no clearly defined signals regarding what business and industry really wanted or needed. All we knew for sure was that education wasn't living up to business and industry expectations. So the educational community speculated as to what was needed and designed a 'patchwork quilt' of non-correlated and unrelated educational courses, and hoped that a satisfactory learner product would result.

Second, for almost two decades, federal vocational/technical education legislation in the United States, and in some places around the world, has given lip service to the integration of the academic and vocational education curriculum but the ensuing results have been minimal at best. Notwithstanding the fact that academic/vocational integration is virtually non-existent, I'm becoming increasingly convinced that the integration concept lacks understanding in terms of what's implied.

Third, in recent years, even though the hue and cry has been in support of educational reform, more time and energy appears to have been devoted to protecting the architecture of the old rather than designing something new and improved. Text books continue to be grounded in the discipline and establish the basis for what's taught, the sanctity of traditional courses has been repeatedly affirmed, and the way that teachers are prepared hasn't changed significantly in the past 30 years.

The end result has been, and continues to be, a fragmented and ineffective educational process that does not and cannot be responsive to the needs of a 21st Century high performance workforce. Radical change must come about and those institutions that are willing to accept and institutionalize such change will be the leaders in workforce education.

Workforce education institutional leaders of the future must subscribe to the principle and practice that external standards drive the curriculum, and they must respond accordingly. This will require a close collaboration between institutions and the business, industry and organized labor communities on a continuing basis since employment needs will be constantly shifting and changing. Such collaborative arrangements will also require the commitment of significant resources on the part of institutions in terms of time and money.

Leaders in workforce education of the future will also need to seriously scrutinize the traditional organizational structure of courses and, to the extent possible, abandon such a structure in favor of a truly integrated curriculum that is standards driven. What does this really mean? According to Webster's Collegiate Dictionary, to integrate means "to form, coordinate, or blend into a functioning unit or unified whole". If that definition applies to the integration of academic and vocational education, then separate courses, even though they may be coordinated, would not meet the integration definition. By using the standards rather than courses as the basis for curriculum organization, learning activities and scenarios could be designed that would require learners to use, in concert, essential math, science, communications, technology, occupational, diagnostic, problem solving and team work skills to address real world problems.

Such an approach to learning would parallel the work environment beyond the school and coincide with an emerging and promising educational phenomenon called contextual learning that:

- relates learning in the context of life experiences;
- transfers learning in the context of existing knowledge - using and building upon what the student already knows;

- applies learning in the context of how knowledge/ information can be used;
- offers learning in the context of exploration, discovery and invention; and
- positions learning in a cooperative context of sharing, responding and communicating with other learners.

A teaching and learning reformation of this magnitude will not be easy, to say the least. The traditional roles of administrators, department structures, teachers and instructional support staff would need to be challenged and altered significantly, and cooperative planning, team teaching and the use of authentic assessment techniques would be inherent to the successful implementation of such a concept. All of this implies the need for extensive and intensive staff development if such a wide scale reform were to come to pass.

Greater responsibility for learning would rest with the learner and accountability would be tied closely to learner performance that would be continuously monitored using various means throughout the learning experience. Credits and promotion would be tied to performance rather than the fulfillment of specified time requirements. And learner credentials would be based upon demonstrated proficiency in relation to the standards rather than the satisfactory completion of prescribed courses over time.

However, learners prepared in this fashion, in my judgment, would be welcomed by the employment community.

Worksite Learning - There is no substitute for experience and worksite learning provides the opportunity for the learner to experience first hand the demands of the everyday work world. The German dual system has long subscribed to this phenomenon through the use of a highly structured apprenticeship program requirement.

While this concept is not new to the vocational/technical education community, its full potential and worth have oft times not been sufficiently tied to the total curriculum. A properly orchestrated

worksite learning experience can add richness to the education and training curriculum by supplementing school-based learning, facilitating communications between school personnel and the employer, and providing for a smooth transition from school to work for the learner. Such an experience also affords the employer a recruitment advantage in that it offers a trial period during which worksite learners can be observed regarding their prospective full-time employment potential with the firm.

Several worksite learning options are available to learners, depending upon their readiness for such an experience and the purpose that the experience is to fulfill. These options, in descending order of intensity, include:

- *Job Shadowing* - the learner follows the individual as he/she performs workplace tasks for a designated number of days. In this way, the learner experiences the work environment and better understands the types of skills needed for specific occupations.

- *Mentoring* - the learner is paired with an adult worker who can help him /her receive training and gain experience. Also, the learner learns to get along with new people and deal with real-world situations.

- *Cooperative Education* - a structured and coordinated work experience that relates closely to the occupational aspects of the learner's educational program. It usually involves a single employer under a defined agreement with the school and typically involves pay for work performed. The work experience transcends an extended period of time from several weeks to several months.

- *Youth Apprenticeship* - a structured program of paid work that uses the workplace as a learning laboratory to develop learner competencies in technical areas and related mathematics, science, communications, and problem solving. Great emphasis is placed on learning by doing under the keen supervision of a mentor or journeyman worker. Apprentices receive a recognized

credential when the apprenticeship program requirements are satisfactorily completed.

- *Internship* - a program of paid work under close supervision in an occupational area to gain experience in a specific field. An internship differs from a youth apprenticeship experience in that the intern has completed the educational requirements of a training program and uses the internship to apply related knowledge and hone specialized skills associated with a particular job.

It was not the intent of this section to offer great detail regarding the design and administration of a worksite learning component. However, a discussion of the new curriculum for vocational/ technical education for the 21st Century would have been less than complete without it.

IN SUMMARY -

...we should not change simply for the sake of change. However, through our decisions, what we continue to do will need to be done even better. Many points that I have touched upon are being done pretty well.

For example, vocational/technical education, more than any other sector of the education community, has been sensitive to the needs of the customer; business, industry and labor. And, more than any other sector of the education community, vocational/ technical education has accepted the responsibility for being accountable for what it does in terms of job placement and retention, wage advantage, and social and gender equity. And, more than any other sector of the education community, vocational/technical education has been challenged regarding various dimensions of educational reform and has positively responded to those challenges in terms of bringing the academic and vocational disciplines into closer communion.

On the other hand, there are factors and forces, that if not addressed, will weigh heavily upon how effective vocational/

technical education can be regarding its role in workforce preparation in the 21st Century.

Occupations will need to be viewed in the broader context of **career clusters** in order to organize and deliver the kind of education and training that will accelerate the marketability, transferability and adaptation of knowledge and skills across a dynamic and customer-driven job market. **Performance standards and authentic assessment strategies** will be key to framing the new curriculum that address the career clusters.

Organizational architecture and conventional course structures appear to be obsolete. **New approaches to curriculum** building will be needed that are standards driven and problem centered, creating educational experiences that simulate, as closely as possible, the real-world and real work-related problems and conditions that call for real- world solutions, both in process and results. The notion of high performance must transcend the workplace to our educational institutions and 21st Century learners must take on the same high performance characteristics as the 21st Century workforce.

More attention must be given to **worksite learning** and its potential for supplementing and enriching school-based education and training. And, although still in its infancy, distance learning technology could introduce a whole new variable into worksite learning opportunities.

Two conspicuous voids in this discussion included the role and use of learning technology in workforce education, and professional development. While the importance of these two topics go without question, it was felt that they could not be adequately addressed within the parameters of this presentation, and could easily justify special treatment.

It truly is a time of opportunity; a time to invest in the best and create new possibilities.

Thank you.

Selected References

Bailey, Thomas, and Donna Merritt. "Making Sense of Industry-Based Skills Standards." Draft. Columbia: The Institution on Education and the Economy, 1994.

Carnevale, Anthony Patrick. "America and the New Economy," American Society for Training and Development, Alexandria, VA.

Cohen, Philip. "Designing Performance Assessment Tests." *Education Update*. August 1995: 37(6), Alexandria, VA: The Association for Supervision and curriculum Development.

Commission on Skills and the American Workforce. "America's Choice: High Skills or Low Wages!" Rochester, NY: The National Center on Education and the Economy, 1990.

Deming, W. Edwards. *Quality, Productivity, and Competitive Position*. Cambridge: Massachusetts Institute of Technology, 1982.

Drucker, Peter F. "The Age of Social Transformation." *The Atlantic Monthly,*
November, 1994, pp. 53-80.

Goad, Tom W. "Information Literacy: The Essential Skill for Lifelong Learning and Workplace Success." Abstract. National University Research Institute's Lifelong Learning Conference, 1992.

Herman, Joan L, Pamela Aschbacher, and Lynn Winters. *A Practical Guide to Alternative Assessment.* Alexandria, VA: Association for Supervision and curriculum Development, 1992.
Naisbitt, John and Patricia Aburdene. *Re-inventing the Corporation.* Warner Books, Inc. New York, 1985.

Secretary's Commission on Achieving Necessary Skills. "What Work Requires of Schools: A SCANS Report for America 2000."

Washington, DC. Government Printing Office, 1992.

Wirt, John G. *Performance Assessment Systems: Implications for a National System of Skill Standards.* Vol. I., Washington, DC: National Governors' Association, 1994, vii.